

# Revisiting Armaments Production in Southeast Asia: New Dreams, Same Challenges

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*Several states in Southeast Asia have long attempted to produce their own armaments, both to support national security and to aid in national economic and technological advancement. In most cases, however, such efforts have been decidedly disappointing, and few local arms industries have been economically or technologically self-sustaining. Nevertheless, we may be witnessing a new phase of renewed interest among several Southeast Asian nations in expanding their capabilities for indigenous arms manufacturing, as evidenced in particular by new defence-industrial initiatives in Indonesia and Malaysia. These efforts have been supported by a long-term growth in defence expenditures and new efforts to utilize industrial offsets (such as technology transfers and localized production) as a part of arms acquisitions to build up local arms industries. It is unlikely, however, that these efforts alone will suffice to create economically viable local defence industries. Consequently, countries in the region will still have to make tough decisions about the future course of their defence industrial bases. Most likely, they will have to either invest considerably greater resources into developing their defence sectors (which may beyond their capacities and which are still no guarantee of success) or else they have to scale back their ambitions and choose to concentrate in niche areas where they have a better chance of being competitive in the global arms marketplace.*

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**Keywords:** Southeast Asia defence industry, armaments, aerospace, shipbuilding, technology.

Armaments production in Southeast Asia has always been long on ambition and short on reality. Going back to the 1960s, several states in the region have attempted to manufacture their own arms, but not much ever came of these efforts. Indonesia, for example, invested considerable resources into establishing strategic enterprises covering aerospace, shipbuilding and land systems, but they produced little in the way of useful military products, and they failed to become self-sustaining ventures. Vietnam and the Philippines have constructed naval vessels, Thailand has assembled light trainer jets and Malaysia has attempted to leverage its few niche capabilities in defence and aerospace manufacturing to become a player in the global supply chain. However, except for Singapore — whose indigenous defence industry has benefitted from relatively high levels of defence spending — Southeast Asia has produced few success stories when it comes to arms manufacturing.

After more than a decade of neglect and decay, however, there are indicators that Southeast Asia's defence sectors may be rebounding. There is a newfound ambition and effort underway in several states in the region to revitalize and rebuild their ailing defence industries, or attempt to create new centres of armaments production. Vietnam and Thailand are considering efforts to expand indigenous arms manufacturing, and the Philippines is exploring new military roles for its shipbuilding industry. Indeed, as regional defence spending grows and, subsequently, regional arms acquisitions also increase, Southeast Asia may be on the cusp of a rebirth in armaments production.

However, before becoming too sanguine about the future of the region's defence industrial capacities, it is important to keep in mind the extremely high barriers to advanced armaments production that still exist. Desire and determination are insufficient substitutes for arduous effort, technology, and, above all, money, when it comes to arms manufacturing. Significant challenges — many of them of long standing — still come in the way of regional states becoming successful arms producers, as will be illustrated by the recent experiences of the three leading weapons-producing states in Southeast Asia — Indonesia, Malaysia and Singapore — and their recent experiences and efforts to renew or expand local arms industries.

### Why Do Nations Produce Armaments?

As with other nations, Southeast Asian countries have many reasons for producing armaments.<sup>1</sup> Often, the most critical rationale is security of supply. In general, countries desire a reliable source of arms with which to defend themselves, and that secure source is usually a domestic one. Consequently, if they are capable of doing so, achieving some degree of self-reliance in arms procurement can be a key strategic goal. This requirement is particularly felt when a nation has no allies or patron-state providing an external security guarantee. In the case of Southeast Asia, for example, the withdrawal of British forces in 1971, as well as the promulgation of the Nixon Doctrine (which asserted that US allies were largely in charge of their own security), resulted in a heightened sense of strategic isolation and insecurity, and therefore provided regional states with a powerful new incentive for arming themselves — and with domestically produced weapons, if possible.<sup>2</sup>

Parallel to this aspiration for self-reliant defence is the fear that depending too heavily on imported weaponry risks exposing a country to arms embargoes, cut-offs and other types of supplier restraint, thus weakening a nation's military capabilities and undermining its national security. Foreign dependencies for armaments can also leave the buyer-state exposed to attempts by the supplier to withhold arms deliveries in order to coerce the former into making concessions on issues both national (such as human rights) or international (such as combating terrorism and drug trafficking or opposing a common regional threat). The United States, for example, in the late 1990s embargoed weapons sales to Indonesia in response to human rights violations in occupied East Timor. For a long time, too, it was US policy *not* to introduce particular weapons, such as advanced air-to-air missiles, into the region, unless other comparable weapons systems had already been exported there.<sup>3</sup> Therefore, reducing one's reliance on foreign sources of arms can be a crucial military objective, while also strengthening national political independence.

Another strategic rationale driving defence industrialization, especially among developing nations, is the more intangible aspirations of national pride and prestige. Possessing an independent defence industrial capability feeds directly into many states' concepts of national power — not only by creating military power but also by demonstrating its industrial and technological prowess, and thereby confirming its status as a nation to be reckoned with.

Indonesia's military rulers, for example, embarked on an ambitious defence industrialization programme in the 1970s based in part on the belief that a strong regime was unsustainable in the absence of a strong domestic arms industry.<sup>4</sup> This "rich nation/strong army" syndrome is not confined to aspiring Great Powers, such as China or India, or to middle powers, such as Indonesia or South Korea. Such "technonationalism" — the idea of consciously and deliberately nurturing indigenous armaments production, usually through government-initiated industrial policy, as a means of achieving self-reliance in arms procurement<sup>5</sup> — can be detected on the part of many smaller arms-producers. As Singh points out, Singapore regarded a robust indigenous defence industry as an important compensation for its small size and vulnerability ("its midget psychosis" to use Singh's term) with regard to its large neighbours.<sup>6</sup>

If strategic concerns are one side of the coin driving self-reliance in arms procurement, economics is generally the other. Armaments production has often been seen as providing many actual or potential economic benefits to the nation as a whole. In the first place, defence industrialization can promote backward linkages spurring the development, expansion, and modernization of other manufacturing sectors in the national economy, such as steel, machine tools, and shipbuilding, as well as building up general skills and know-how. All this industrial development, in turn, provides lead-in support, equipment and personnel for the production of armaments. The construction of warships, for example, can stimulate the establishment of indigenous shipbuilding industries, while production of military vehicles requires steel mills and automotive factories to provide critical parts and components, such as armour plating, chassis, and engines, as well as the skilled labour to assemble these vehicles.<sup>7</sup>

Armaments production can also serve as a "technology locomotive" spurring the growth of new industries and new technologies, particularly in the aerospace, electronics and information technology sectors.<sup>8</sup> Military aerospace programmes, for example, often constitute the basis for civil aircraft production. Defence industrialization can also function as an important import-substitution strategy, and instead of sending capital — and especially government monies — out of a country via arms imports, indigenous arms production can help to create jobs, ameliorate trade imbalances and protect foreign currency reserves. The economic and technological impetus was particularly evident in Indonesia's initial approach to defence

industrialization. Beginning with President Soeharto and continuing up to the present day, the arms industry has been seen as an instrument for national development and industrialization.<sup>9</sup> Defence industries were supposed to contribute directly and indirectly to the nation's technological and industrial modernization, both through the creation of new strategic industries manufacturing both military and commercial products, and by raising the country's level of technical expertise, manpower skills and industrial infrastructure. In particular, the establishment of an aircraft-manufacturing company in Indonesia was supposed to boost both the country's military and civil aviation sectors.

Finally, by *exporting* arms, local defence firms can constitute an important source of foreign currency earnings. Singapore, for example, has become a modest player on the international arms market: it has sold assault rifles to Croatia and Brunei; machine guns to Brunei, Croatia, Indonesia, Peru, the Philippines, Slovenia, Thailand and Zimbabwe; and it has licensed the production of a 40 mm automatic grenade launcher to Indonesia and Italy.<sup>10</sup> In 2008, it scored a major overseas sale with an agreement to supply the Bronco all-terrain tracked infantry carrier to the British army.<sup>11</sup> In perhaps its most controversial move, in the late 1990s Singapore exported an entire turnkey facility to Myanmar for the manufacture of small arms and ammunition.<sup>12</sup> Indonesia, meanwhile, has exported assault rifles (a copy of the Belgian FN FNC) to Cambodia, Nigeria, the United Arab Emirates (UAE) and possibly Mali.<sup>13</sup>

### **Arms Production in Southeast Asia: The Cases of Indonesia, Malaysia and Singapore**

Nearly every large country in Southeast Asia produces some kind of arms. Most of this manufacturing is decidedly minor, however, consisting mostly of small arms (assault rifles, pistols, etc.) and munitions. Thailand, for example, produces ammunition for its armed forces, along with mortars, rocket launchers and 4 × 4 military vehicles. During the 1980s, it assembled German-designed trainer jets from imported kits, and it has constructed several small naval vessels over the years; most recently, the state-run firm Bangkok Dock finished assembly of a British-designed offshore patrol vessel, HTMS *Krabi*.

Vietnamese defence manufacturing is mostly confined to small-scale shipbuilding (such as patrol vessels and auxiliary ships), most of which are based on foreign models. The country is also entering

into licensed production of Russian-designed missile systems, e.g., the *Yakhont* anti-ship missile and the *Igla* man-portable surface-to-air missile. Vietnam's arms production ambitions were dealt a severe blow in 2010, however, when Vinashin (the country's large state-owned shipbuilding corporation) collapsed under a debt burden of US\$4.5 billion.<sup>14</sup>

For the most part, however, just three countries in Southeast Asia — Indonesia, Malaysia and Singapore — dominate the regional arms-manufacturing sphere. The arms-production experiences of each of these states will be briefly examined in turn.

### *Indonesia*

Indonesia began armaments production in earnest in the mid-1970s, with the establishment of several state-owned "strategic enterprises", the most important of which were PT *Industri Pewsawat Terban Nusantara* or IPTN (aviation and aerospace), PT PAL (shipbuilding) and PT Pindad (small arms and munitions).<sup>15</sup> Of these, IPTN was particularly revealing of Indonesia's greater goals for harnessing armaments production for industrial modernization and development. IPTN was the personal brainchild of its founder and first director, B.J. Habibie, who was also the country's Minister for Research and Technology from 1978 to 1998 and who eventually replaced Soeharto as President in 1998. Habibie — who as the research and technology minister also eventually headed up PT PAL and PT Pindad — explicitly viewed the establishment of an aerospace industry as both an instrument and a model for advancing the country's overall technology and industrial base.<sup>16</sup> IPTN in particular was to serve as an indicator of Indonesia's intentions to become a modern industrialized nation and "to prove that a Third World, Muslim-majority country could make a hi-tech leap into global aviation".<sup>17</sup>

The key to realizing these goals was an evolutionary industrial development strategy that explicitly used defence offsets to acquire the necessary research, design, and manufacturing expertise, in order to give "optimal results in the efforts of mastering aviation technology in a relatively short period of time, [i.e.,] 20 years".<sup>18</sup> Offsets are industrial-technological agreements whereby, as part of an arms purchase, the supplier consents to giving back to the purchaser a certain percentage value of the deal (i.e. to "offset" the cost of acquisition), usually in the form of licensed-production rights, technology transfers or other types of industrial participation

in the said weapons acquisition programme. Subsequently, IPTN pursued a technology-transfer philosophy dubbed “Begin at the End and End at the Beginning”:

It is a philosophy to absorb advanced technology progressively and gradually in an integral process and based on Indonesia’s objective needs. Through this philosophy was thoroughly mastered, not merely materially but also the capability and expertise [of aircraft production] ... The philosophy teaches that in building aircraft, it does not necessarily start from components, but [from directly learning] the end of a process (already built aircraft), and then reverse through phases of component manufacturing [sic].<sup>19</sup>

This technology development programme was to run through four distinct and progressive phases. Phase one involved the “mastery of manufacturing capabilities”, through subcontracting and licensed production of foreign aircraft designs, “providing the opportunity for both management and the workforce to gain knowledge, skills, and experience”.<sup>20</sup> Phase two entailed the integration of technology and the expansion of workforce skills via joint projects with foreign partners. Phase three — technology development — entailed initial efforts to design, develop and manufacture an aircraft entirely on its own. Finally, during phase four — “basic research” — IPTN was to engage in the indigenous research and development of basic technologies, such as materials, propulsion and electronics. Breakthroughs made at this stage would be fed into future aerospace programmes.

Consequently, IPTN made its start with the licensed-production of several different kinds of foreign-designed aircraft, including the Spanish NC-212 light transport plane, the French NAS-332 helicopter and the US Bell 412 helicopter. Initial manufacturing entailed the relatively simple assembly of imported knock-down kits, but eventually aircraft in these production runs were to involve greater domestic content, until most platforms were built almost entirely indigenously.<sup>21</sup> During this phase IPTN also manufactured components for F-16 fighters and British Hawk trainers purchased by the Indonesia Air Force. In the early 1980s, IPTN progressed to the co-development of the CN-235 transport aircraft, a joint venture with CASA of Spain. The CN-235 was adapted both for military purposes (as a cargo and maritime patrol aircraft) and for civilian use as a commuter plane. IPTN has exported the CN-235 to the UAE, Brunei, Malaysia, Pakistan, South Korea and Thailand. During the 1990s, IPTN developed the N-250, a 50-seat turboprop



commuter aircraft designed and manufactured entirely in Indonesia (although still using a large number of foreign components, such as the engine, avionics and landing gear). Two N-250 prototypes were built, and the plane first flew in 1995.

Shipbuilding and small arms followed paths only slightly different from that of IPTN. PT PAL has constructed German-designed 57-meter patrol boats for the Indonesia Navy (TNI-AL), and may build two Dutch-designed *Sigma*-class corvettes. PT PAL also designed a 35-meter and 60-meter patrol vessels for possible production for the TNI-AL.<sup>22</sup> For its part, PT Pindad produces under license the Belgian FN FNC (SS1 and SS2 series) assault rifle, as well as submachine guns from Italy, mortars from Finland and Israel, and grenade launchers from Singapore.<sup>23</sup> PT Pindad also manufactured sidearms, small arms ammunition and mortars (but, oddly enough, *not* large-caliber ammunition, such as 105 mm or 155 mm artillery rounds). Finally, Pindad designed an indigenous 6 × 6 wheeled armoured personnel carrier (APC), modelled after French-made VAB APC and designated the *Panser*.<sup>24</sup>

By the mid-1990s, Indonesia's defence industry — and certainly its aerospace business — appeared to be riding high. IPTN in particular enjoyed preferential treatment as a strategic enterprise, backed up by strong central government support (Jakarta invested billions of dollars in the company, while Habibie was part of Soeharto's inner circle) and a captive market (both the Indonesia military and domestic commuter airlines were often compelled to buy IPTN products).<sup>25</sup> By 1997, IPTN had grown to a workforce of almost 16,000 and the company was intending to become “the Toyota of aerospace,” with an aircraft to meet every niche in the 20- to 130-seat range”.<sup>26</sup> Its main factory at Bandung featured a state-of-the-art manufacturing facility, including several dozens of advanced computerized numerically controlled tools.<sup>27</sup> It had one major indigenous programme — the N-250 commuter plane — already flying and another — the notional N-2130 100-passenger regional jet — on the drawing board. Indonesia appeared to be making considerable strides towards meeting its goals of self-sufficiency and creating a world-class defence/commercial aerospace sector.

Much of this apparent success was illusory, however. In fact, Indonesia was finding it increasingly difficult to break into civil aviation manufacturing at the level of a systems integrator (i.e., the ability to bring together numerous subsystems and components into a single finished product and have it function as a whole) or even as a major partner in collaborative aircraft programmes with



foreign firms. The Indonesian government poured nearly \$1 billion into the N-250 programme, but despite this huge investment, the aircraft continued to experience considerable teething problems.<sup>28</sup> In addition, the plane failed to receive certification from the US Federal Aviation Authority, which made it almost impossible to market the aircraft overseas. At the same time, orders began to dry up for its other products.<sup>29</sup>

The 1997-98 Asian Financial Crisis was a defining event for Indonesia's defence industry. Jakarta was forced to re-examine and ultimately dramatically scale back its ambitious plans for its aerospace industry and downsize its arms industry. As a condition of the bailout by the International Monetary Fund, the central government was forced to cut off all support to IPTN, and by 2000 the company had run up a debt of over \$500 million. In response, the company underwent a major restructuring, which included a name change (to PT *Dirgantara Indonesia* [PT DI], or Indonesian Aerospace), the divestiture of unneeded production capabilities (particularly in the area of engineering), and, most significant of all, the elimination of more than three-quarters of its overall workforce.<sup>30</sup>

By the end of the first decade of the twenty-first century, much of Indonesia's defence industry was at a standstill. Most military programmes were far behind schedule, due to governmental and corporate financial constraints, and actual defence production was nearly non-existent (small arms and ammunition is perhaps the sole exception). The country's showcase company PT *Dirgantara Indonesia* suffered particularly: PT DI was forced to eventually reduce its workforce to around 3,500 employees (which is probably still too many personnel for what little work it currently has), and to cancel several key manufacturing projects, most notably the N-250 and N-2130 commercial airliner projects. For its part, PT PAL has had to lay off 900 of its 2,300 employees. Altogether, Indonesia's defence industrial workforce has shrunk to around 9,000 workers.<sup>31</sup>

### *Malaysia*

The Malaysian defence industry has even less coherence — structurally, organizationally or conceptually — than Indonesia's. Malaysia manufactures arms for both military and economic reasons, i.e., to achieve self-reliance in spares and logistics support, modification, upgrades, retrofits; to create high-tech employment, value-added work, and backward linkages in support of local industry (especially small and medium-sized enterprises, or SMEs); and to obtain high-

end sensitive military technology and know-how as well as economic spin-offs to Malaysia's non-defence industrial sectors. In terms of its strategic function, local defence production serves mainly to cater to the needs of the Malaysian Armed Forces (MAF), in particular, by helping to sustain equipment purchased from overseas (e.g., through life support and production of spares and replacement equipment).<sup>32</sup>

Nevertheless, while Malaysia categorizes the defence sector as a "strategic industry", there has actually been minimal central planning for a defence-manufacturing sector and consequently very little real defence industrialization.<sup>33</sup> The local defence industrial base is a hodgepodge of private and state-owned companies, most engaged mainly in maintenance, repair and overhaul (MRO) activities, or in low-end manufacturing of parts, components, or sub-assemblies. Key arms-manufacturing companies include: AIROD (which mostly carries out MRO for Royal Malaysian Air Force [RMAF] aircraft, as well as modifications and upgrades of RMAF airframes; for example, AIROD undertook the conversion of C-130 cargo planes into air-to-air refuelling tankers, in addition to the modernization of avionics on imported Mi-171 helicopters); SME Aerospace (which manufactured pylons for Hawk trainer jets supplied to RMAF); SME Ordnance (undertook licensed manufacture of the US M4 carbine, as well as ammunition, mortars and explosives); Sapura Defence (which produces communications gear and electronic warfare systems); Deftech (a licensed producer of the Turkish-designed ADNAN tracked armoured vehicle); and CTRM (which manufactures the Eagle unmanned reconnaissance aircraft). In addition, the Malaysian government operates the Boustead Naval Shipyard, which constructed the *Kedah*-class Next Generation Patrol Vessel (based on the German MEKO A-100 design) for the Royal Malaysian Navy (RMN).

At the same time, the development of Malaysia's arms industry has been hampered by a number of challenges, which include, according to one former local defence industry executive "the lack of critical mass [and] high capital investment, lack of research and development, rigid specifications, lack of competencies, absence of uniformity, and lack of promotional and marketing activities".<sup>34</sup> Additionally, the Malaysian defence industry has suffered from an inability to garner any significant overseas arms sales that help create economies of scale (and therefore reduce unit costs) and generate additional income.

However, it is probably the lack of an organized and centrally managed defence research and development (R&D) base that is probably the most serious impediment afflicting the Malaysian defence sector. Most military-related R&D is self-financed by individual firms, consequently resulting in a series of *ad hoc*, under-financed defence projects (e.g., Deftech's effort to develop an indigenous wheeled armoured vehicle).

One way that Malaysia has tried to overcome its deficiencies in indigenous R&D capabilities is through offsets, particularly licensed production and technology transfers; even then, this strategy has borne only limited success, mainly due to the still-limited capacity of local industry to absorb and exploit imported know-how.<sup>35</sup> For example, Malaysia is keen to co-produce two *Improved Lekiu*-class frigates being acquired by the RMN; however, BAE Systems, the British-based lead contractor for this programme, has been reluctant to include local shipbuilders in any kind of significant industrial cooperation, arguing that they are "not advanced enough" to play a large role in the programme.<sup>36</sup>

Poor programme oversight has also tended to hinder local military projects, most notably in the *Kedah*-class shipbuilding programme. Initially, an ambitious plan to build twenty-seven large OPVs, the *Kedah* project was plagued by mismanagement, fiscal irregularities, quality control problems and delivery delays. The first ship in the series actually failed to pass its pre-delivery sea trials due to technical problems and quality issues, and the resulting scandal forced the Malaysian government to put a new management team in place and transfer construction to a different shipyard. Eventually the *Kedah*-class programme was reduced to just six ships.

Malaysia's current strategy for its indigenous defence sector appears to be a dual-use approach, i.e., spinning off industrial capacity to commercial use or exploiting commercial technologies for military purposes. In particular, Kuala Lumpur is seeking to support the civilian side of Malaysia's defence-relevant industry in terms of building up job skills, and technological development.<sup>37</sup> For example, military MRO provider AIROD is now heavily involved in maintenance and overhaul work on several types of commercial aircraft, while SME Aerospace produces parts and sub-assemblies for Boeing, Airbus and Eurocopter.

None of these initiatives, however, have so far done much to directly increase the capabilities of local arms producers to design, develop, and manufacture indigenous weapons systems, especially more advanced systems. Overall, the Malaysian defence sector still

operates on a more or less *ad hoc* basis, emphasizing immediate economic returns, with little centralized thought or effort given to ensuring that arms production is sustainable, expandable or evolutionary (i.e., rising up the technological ladder).

### *Singapore*

As a small nation with limited natural resources, a declining birth rate, a shortage of skilled manpower, no strategic depth and sandwiched between two large potentially threatening neighbours, Singaporean armaments production has been focused first and foremost on meeting the immediate needs of the Singapore Armed Forces (SAF). In addition, since high technology is seen as a critical force multiplier, arms procurement decisions have been generally measured against what the Singaporeans can affordably do by themselves and what makes more sense to buy from foreign sources.<sup>38</sup>

When it comes indigenous arms production and defence industrialization, therefore, Singapore — as opposed to Indonesia, for example — regards any potential economic benefits as secondary to the task of bolstering the country's defence capabilities. As one observer stated, "The Singapore defence industries are not viewed as part of the country's economic development strategy, as they are in Indonesia, but rather are viewed as an integral part of the country's concept of Total Defence."<sup>39</sup> Consequently, Singapore has traditionally tended to take a more pragmatic and therefore more selective approach towards defence industrialization. It has never sought nor even harboured the goal of self-sufficiency in armaments production, and the country has remained entirely dependent upon foreign sources for such critical weapons systems as fighter aircraft, helicopters, submarines, tanks, and all kinds of tactical missile systems (air-to-air, surface-to-air, anti-tank, etc.). Instead, the local defence industrial base is geared primarily towards guaranteeing the supply and maintenance of critical systems, and towards developing the capability to upgrade and modify imported weapons systems.<sup>40</sup>

Local arms production is centred mainly on the state-owned ST Engineering (STEngg), formerly Singapore Technologies Engineering. STEngg has its roots in Chartered Industries, established in the mid-1960s to produce small arms ammunition for the SAF. After going through several expansions and reorganizations, STEngg presently comprises four main subsidiaries: ST Aerospace (aircraft manufacturing and maintenance); ST Electronics (communications,

sensors, software, and combat systems); ST Kinetics (land systems and ordnance); and ST Marine (shipbuilding). By 2012, STEngg employed over 22,000 workers worldwide and boasted revenues of S\$6.4 billion (\$5.11 billion).<sup>41</sup>

Singapore has been the most successful in the domestic development and production of small arms, artillery systems, light armoured vehicles and certain classes of naval vessels. ST Kinetics has outfitted the SAF with the indigenously designed and manufactured SAR 21 assault rifle, and it also produces machine guns, grenade-launchers, mortar systems, towed and self-propelled 155 mm howitzers. The company also manufactures three light armoured vehicles for the SAF and for export: the Bionix tracked infantry fighting vehicle, the Terrex 8x8 wheeled armoured personnel carrier and the Bronco all-terrain tracked carrier. Additionally, during the 1990s the country designed and constructed several *Fearless*-class OPVs (which will subsequently be replaced by another indigenous model), along with four 8,500-ton *Endurance*-class landing ships. Much of the rest of local arms manufacturing has revolved around licensed-production or the maintenance and upgrade of SAF equipment. Licensed production has generally been employed in those defence sectors where Singapore believes it can best contribute to eventual self-sufficiency in design, development and production, and where it believes that indigenous production can meet national defence requirements *and* still be cost-effective and technologically world-class. Consequently, Singapore has regularly engaged in Industrial Cooperation Programmes with foreign suppliers that require technology transfer and training as part of licensed production arrangements or off-the-shelf buys.<sup>42</sup> These cooperative agreements, in turn, have mostly been used to expand the local defence industry's maintenance, repair and upgrade capabilities. During the 1970s and 1980s, for example, ST Marine constructed both 45-meter and 62-meter missile patrol boats under license from Germany's Lürssen, as well as *Landsort*-class minehunters under license from Sweden's Kockums. Building upon these experiences, Singapore was able to design and construct the indigenous *Fearless*-class and *Endurance*-class vessels. ST Marine has also constructed five French-designed *Lafayette*-class frigates (designated the *Formidable* class by the RSN), in part to learn how to maintain and upgrade these vessels over its multi-decade lifespan. During the 1970s and 1980s, Singapore licensed produced the US M-16 assault rifle as well as manufacturing foreign designed small arms, such as the

Ultimax 100 and the SAR 80, before graduating to producing an entirely indigenous assault rifle, i.e., the SAR 21.<sup>43</sup>

Singapore's defence industry has also developed considerable expertise in logistics and depot management, in the maintenance and overhaul of aircraft and aircraft engines and in ship repair.<sup>44</sup> STEngg, for example, has a collaborative arrangement with Pratt & Whitney to overhaul turbine engine blades, which supports its capacities to overhaul Republic of Singapore Air Force (RSAF) F-16 fighter aircraft.<sup>45</sup> ST Marine has upgraded used submarines acquired from Sweden. In addition, STEngg has built up its systems design, engineering and integrations skills necessary to undertake modernization and upgrade programmes on behalf of the SAF, including refurbishing and refitting RSAF A-4S fighter aircraft with a new engine and new avionics; upgrading RSAF F-5 fighters with a new cockpit avionics suite and radar; modernizing the army's M-113 armoured personnel carriers; and retrofitting the navy's patrol boats with Harpoon antiship cruise missiles and Barak air-defence missiles.<sup>46</sup>

Overall, Singapore appears to have adopted a core competencies/niche production approach to its defence industries. It has consciously decided to concentrate arms manufacturing in those areas where it believes it has particular key strengths — and also greater potential to either export its products or find foreign partners — and either abandoned or declined to enter into those areas where it believed that such armaments production would not be economically viable or technologically competitive. One area, too, where Singapore's defence industry stands out in Southeast Asia is its growing capacity in defence electronics, such as communications systems, sensors and electro-optics (e.g., targeting systems and seekers, lasers, infrared imaging devices, night-vision goggles, etc.), data management, as well as the capability integrate these systems in high-performing packages.

Just as important, perhaps, since the mid-1990s Singapore has begun to commercialize and also globalize its defence business. STEngg has engaged in a concerted effort to reduce its dependency upon contracting to the SAF. ST Aerospace (STAE) has greatly increased its commercial subcontracting business over the past decade, manufacturing components for Western companies such as Eurocopter and Boeing and it has also become a global maintenance and overhaul centre for commercial aircraft — consequently, roughly half of STAE's revenues come from non-military work.<sup>47</sup> ST Kinetics has also entered into the manufacture of heavy commercial vehicles.

Just as important have been the Singapore defence industry's efforts to increase its international footprint through co-development alliances, joint ventures and transnational mergers and acquisitions. STAe, for example, is a member of the US-led international consortium currently engaged in the development of the F-35 Joint Strike Fighter. It is collaborating with Eurocopter France in manufacturing and marketing the EC-120 light utility helicopter, and with Israel's Elta to upgrade F-5 fighter aircraft for the Turkish and Brazilian air forces.<sup>48</sup> ST Kinetics also teamed up with American firm Teledyne Brown Engineering in an (ultimately unsuccessfully) attempt to sell its Bionix infantry fighting vehicle to the US Army to meet the latter's Interim Armored Brigade concept. Singapore has signed defence technology collaboration agreements with several other arms-producing countries, including Australia, France, Norway, South Africa and the United Kingdom; in the case of Sweden, it has created a bilateral technology development fund to jointly finance cooperative R&D projects; Swedish-Singaporean cooperation has been particularly close in the areas of undersea warfare and defence against biological or chemical attacks.<sup>49</sup> Finally, Singapore's defence industry has expanded its overseas operations, with STEngg taking a 25 per cent stake in the Irish company Timoney, which produces suspension systems for armoured vehicles, and also acquiring the US shipbuilder Halter Marine as a wholly owned subsidiary. Altogether, STEngg has more than 3,300 personnel employed outside Singapore.<sup>50</sup> Overall, Singapore's success as a producer of relatively advanced military systems can be attributed to its "niche competencies" industrial strategy, as well as the nation's willingness to maintain a relatively high rate of defence spending, particularly when it comes to military R&D.

### **A Rebirth of Southeast Asian Arms Production?**

Based on this brief examination of the three largest arms-manufacturing states in Southeast Asia, one is justified in being pessimistic about the prospects for defence industries in the region. Overall, the technological level of *indigenous* military products is still quite low. The most advanced armaments produced locally are still foreign-sourced: either licensed produced or based on imported designs and technologies. Even Singapore, for all its success in building up the largest arms industry in Southeast Asia, and given the consistently high quality of its weaponry, is still only truly self-reliant in the design and development of a handful of land-warfare



items: assault rifles and small arms, ammunition, artillery systems, and light armoured vehicles; the rest is all imported or, at the most, licensed-built. Indonesia, easily the most ambitious of the three in its goal of building up a large and innovative arms industry, has consequently suffered the most embarrassing failures; it has only developed one more-or-less indigenous defence product — the CN-235 transport plane — and even that was in cooperation with CASA of Spain.<sup>51</sup> In addition, the arms-manufacturing capabilities of these industries — with the exception of Singapore, in certain sectors — is still quite low, concentrated mainly in areas such as parts fabrication, maintenance and repair, and, in a few cases, final assembly. Consequently, local arms industries remain highly dependent on foreign partners for manufacturing technologies and processes.

That said, hope springs eternal, it seems, when it comes to armaments production in the region. In recent years, there has been a renewed interest in some Southeast Asian capitals in revitalizing their domestic defence industries and engaging in a new round of military production. In Bangkok, Hanoi and Jakarta in particular, government and military officials have been increasingly raising the idea of new reforms, including restructuring their arms industries and reinvigorating them with injections of new cash and new programmes. Thailand, for example, is considering privatizing some of its state-owned defence factories, while Vietnam wants to reform and rebuild its indigenous arms firms, especially in the wake of the Vinashin bankruptcy.<sup>52</sup> Indonesia has been particularly aggressive recently in its efforts to revitalize its defence industry, in conjunction with an ambitious effort to expand its armed forces.<sup>53</sup> For example, Jakarta recently decided to acquire up to sixteen new patrol boats (outfitted with Chinese anti-ship cruise missiles), which are being manufactured on Batam. In addition, a deal to buy submarines from South Korea will include technology transfers to support the construction of at least one boat in Indonesia. Other prospective new indigenous projects include two types of amphibious assault vessels and a 2,500-ton frigate.<sup>54</sup> Most significant of all, in 2011 Jakarta signed an agreement with Seoul to co-develop a new state-of-the-art fifth generation stealth fighter jet, designated the KFX, which is currently being undertaken by the Koreans; Indonesia could invest as much as \$1 billion into the project, for which it would receive a 20 per cent stake in the manufacturing programme and acquire up to fifty aircraft. If successful, this programme would provide considerable stability (both in terms of revenues and employment) for PT *Dirgantara Indonesia* for years to come.<sup>55</sup> To

help keep the country's arms industries afloat in the short term, in 2011 the Indonesian parliament approved a 7.8 trillion rupiah (\$700 million) bailout to PT DI, PT PAL and PT Pindad; in 2012, the government provided PT DI with an additional trillion rupiah (\$90 million) bridge loan to help revitalize the firm.<sup>56</sup>

Malaysia also plans a significant, if less ambitious, expansion of its arms-manufacturing capacities. The Tenth Malaysia Plan (2011–16) entails the acquisition of next-generation patrol vessels, multi-purpose support ships, and perhaps another squadron of fighter jets. Many of these procurement programmes will entail local production or industrial participation. For example, Kuala Lumpur has ordered six new Littoral Combat Ships, based on the French *Gowind*-class corvette, which will be built locally by the Boustead Naval Shipyard in Perak.<sup>57</sup>

Two developments in particular are underwriting these newfound hopes and ambitions when it comes to establishing sustainable indigenous defence industries and expanding the range of regional armaments production. The first has been the recent rise in military expenditures in the region, which in turn has permitted an increase in weapons acquisitions in Southeast Asia — and, by extension, enabled the potential growth of local defence manufacturing.<sup>58</sup> In particular, Indonesia and Malaysia have experienced significant increases in defence spending over the past decade or so. According to the Stockholm International Peace Research Institute (SIPRI), Malaysia's military budget has nearly doubled in real terms between 2000 and 2012, from \$2.4 billion to \$4.7 billion (in constant 2011 dollars). Indonesian defence spending, meanwhile, rose from \$1.9 billion in 2001 (2000 figures are not available) to \$7 billion in 2012 (again, in constant 2011 dollars), a more than three-fold increase.<sup>59</sup>

The other factor is the increasing emphasis on offset requirements in arms purchases as a means of gaining new technologies and human capital skills to support more advanced armaments production. As previously mentioned, offsets are arrangements whereby the supplier, as an incentive to the buyer, offers to transfer to the purchaser certain industrial or technological goods. Offsets usually include the local licensed production of the weapon systems being acquired, training and other types of skills-building, technology transfers, subcontracts, or foreign direct investment (FDI) into the purchasing country's defence industry. In recent years, regional governments have been increasingly demanding more (and larger) offsets in arms deals, and using those offsets to help modernize and reinvigorate their defence sectors.<sup>60</sup> In 2011,

for example, Malaysia instituted a new offset policy that greatly strengthened offset requirements, in particular, creating a target of 100 per cent offset, i.e., offsets equal to the purchase price of the acquisition programme), permitting FDI to count toward offset credits, pressuring foreign suppliers to aid in the export of Malaysian defence products, and the discontinuation of offset multipliers (complicated counting systems whereby suppliers can get a higher relative value for their offsets (for example, providing advanced training and education to local personnel may be awarded a higher offset value than its actual cost, as it hopefully results in long-term skills development). Additionally, Kuala Lumpur reiterated its commitment to greater oversight and evaluation to ensure that offsets would meet their intended goals.<sup>61</sup> For its part, Indonesia passed a new Defence Industry Law in 2012 that, among other things, addresses the issue of increasing offsets and technology transfers to the national defence industrial base.<sup>62</sup>

## Conclusions

Despite these recent defence budget increases and new offset requirements, it is difficult to be optimistic about the future of arms production in Southeast Asia. Overall, most regional arms industries face a difficult time ahead, and sustaining or expanding their indigenous defence industries will be an ongoing challenge. In particular, few of these countries will likely be able to do much over the next decade to increase their technological capabilities or expand their defence industrial footprint beyond a few showcase programmes. Many of these nations still lack sufficient numbers of qualified engineers and technical personnel to engage in more advanced types of armaments production.<sup>63</sup> It is, for example, difficult to see the Indonesians, given the relatively backward state of their aerospace industry, making much of a contribution to a fifth-generation fighter programme. Even Singapore is unlikely to expand its arms production capabilities. About the only area where countries in the region may attain any significant degree of defence-industrial self-sufficiency will remain in the realm of small arms and light weapons (and again, mainly under license from foreign manufacturers).

For most countries — and not just the newly industrializing states of Southeast Asia, but most aspiring regional or Great Powers — the barriers to becoming significant arms producers remain high. The capability to manufacture most types of advanced weapons

systems — especially highly sophisticated systems like combat aircraft, missile systems and even surface combatants (hulls are relatively easy to build, but the combat systems that go on them are incredibly complex) — is beyond the reach of most middling or even relatively industrialized countries. Consequently, except for a few sectors where the basic technologies are relatively mature and accessible (such as small arms), most advanced arms production will remain elusive — and this will most likely continue to be the case no matter how much states raise defence spending or attempt to shortcut the process of armaments development through offsets.

In the first place, while it is true that many countries in the region have experienced significant increases in their defence budgets in recent years, it is unlikely that these spending increases will be sufficient or consistent over a long enough period of time to significantly bolster local arms industries, or that major funding will be channelled into indigenous arms programmes in the first place. Indonesia's defence firms (especially PT *Dirgantara Indonesia*) still remain starved of funding, while Malaysia's ambitious military modernization programme (new ships, submarines, fighter aircraft, tanks, etc.) may eventually end up outstripping Kuala Lumpur's ability to pay for it all.<sup>64</sup> Defence spending in Southeast Asia, despite growing at an impressive annual rate, is still relatively low (only Singapore barely cracks the \$10 billion barrier). Military budgets of a few billion dollars are hardly enough to underwrite robust defence industrial bases.

At the same time, regional experiences with defence offsets could also be taken with a grain of salt. Offsets offer no great shortcuts, either economic or technological, when it comes to achieving viable, self-sustaining defence industries. Arms production is a "capital and technology-intensive industry" requiring significant investments in equipment and personnel,<sup>65</sup> and offsets alone are insufficient to provide for these requirements, especially as a country attempts to move up the ladder of production. Indigenous — and often quite substantial — sources of financial, industrial and human capital must also exist independently in order for a nation to make progress towards the independent development and production of advanced weapons systems.<sup>66</sup> To put it another way, offsets cannot substitute for a strong science and technology base.

An observation made nearly two decades ago with regards to the efficacy of offsets in defence industrialization in South Korea and Taiwan is equally appropriate in the case of Southeast Asian arms industries:

Offsets ... have had limited impact in fulfilling larger plans for becoming self-sufficient producers across a range of systems (much less becoming global players in high tech industries). This apparent failure could be attributable to overly ambitious plans by central governments, as well as a measure of naiveté in understanding the dimension of domestic resources needed to fully exploit such transfers. There is no doubt that domestic capabilities have grown ... as a result of technology licensing, production buybacks and other forms of offsets ... However, offsets have not resulted in anything approaching the creation of global competitors in a vast range of systems ... nor are they likely to in the immediate future.<sup>67</sup>

In sum, therefore, it is unlikely that Indonesia or Malaysia will rise above their current positions as relatively minor players in the global hierarchy of arms producers. Arms production will continue to be *ad hoc* and sporadic, limited mainly to final assembly work (if even that), low-end manufacturing (parts or sub-assemblies), or a few showcase arms projects and generally low-tech in nature (small arms, ammunition, small naval vessels, etc.). In particular, the capabilities of the Indonesian or Malaysian defence industry to develop and produce truly transformational technologies related to modern concepts of network-centric warfare (NCW, which entails the heavy employment of high-technology systems such as unmanned aerial vehicles, precision-guided weapons, and cyber-warfare) will remain very limited, if not non-existent. Even Singapore, with its comparatively advanced defence industrial base — especially in the area of defence electronics and systems integration — is finding it difficult to engage in a technology-intensive, NCW-based “revolution in military affairs”.

In recent years, there have been calls to promote greater regional cooperation when it comes to developing and producing arms. In May 2011, for example, at the Fifth ASEAN Defence Ministers meeting in Jakarta, the participants signed the ASEAN Defence Industry Collaboration (ADIC) initiative.<sup>68</sup> ADIC seeks to enhance defence industrial inter-dependence within ASEAN and foster indigenization and technological independence when it comes to local armaments production. The initiative is focused mainly on initiatives to promote collaborative defence projects, increase regional competitiveness in various dual-use sectors that could have a “spin-on” effect on local armaments production, and in general assist the development and growth of ASEAN’s defence industry. ADIC collaboration revolves around education and training in

the defence industrial sector, regional partnerships, joint ventures and co-production, cooperative military R&D, and joint promotion of military equipment in sales and marketing. Despite all these hopes and intentions for ADIC, little has actually come out of it. Most ASEAN governments and militaries remain suspicious about sharing their technologies or loosening protectionist controls over their national defence industries. In addition, given the uneven levels of defence industrial development in the region, many nations are unable to participate as meaningful partners in any collaborative arms programme. Consequently, ADIC remains a stillborn effort.<sup>69</sup>

Overall, armaments production in Southeast Asia, despite admirable efforts of late to restructure and revitalize local defence industries, will remain a difficult affair. Only Singapore will likely be any kind of a player in the global arms-marketplace even then, it will likely remain only a niche manufacturer in a few, relatively low-tech fields (e.g., small arms, armoured vehicles), except perhaps in a few areas such as weapons upgrades and systems integration, where Singapore has some additional expertise. This is not to say that, sometime in the future, other regional states may eventually break into the higher reaches of the global arms market, but it will take time and considerable effort before they can do so. They would require not only continued overall industrial and economic development, but a concerted long-term effort to build up their national science and technology bases, expand tertiary education in cutting-edge high-technology fields (such as aeronautical engineering, information technologies, electro-optics, biotechnology, etc.) in order to grow human capital skills, direct greater resources into military R&D, modernize defence manufacturing capabilities, and, above all, maintain a consistently high enough rate of military expenditures in order to fund all these activities. Even then, for Southeast Asian nations to become “successful” arms producers, they will probably need to concentrate on a few core areas where they can carve out a competitive niche for themselves in the global arms market; in other words, attempting to achieve across-the-board capabilities when it comes to arms manufacturing will likely remain forever beyond their grasp, in terms of economic sustainability and technological viability (Indonesia, in particular, needs to learn this lesson). This means playing a decidedly narrow or subordinate role in the international arms business, either as a producer of a few high-quality military systems or

as a subcontractor to larger, already established (Western) arms manufacturers. Such an industrial strategy may not be glamorous, but it will likely be more profitable.

Alternatively, of course, these countries could simply decide to remain at the low-tech end of arms manufacturing, e.g., constructing hulls for naval vessels, small arms production, licensed assembly of imported weapons kits, etc. Even then, such a modest approach to arms production will still be a challenge, as it will be continually *ad hoc* and difficult to make economically sustainable. At the same time, it will not make much of a contribution to overall national economic and technological development.

In the case of arms manufacturing, therefore, one usually goes big, goes high-tech or goes home. In sum, the future is not totally dim for aspiring Southeast Asian arms producers, but it will be arduous and it will likely involve some hard choices and lowered ambitions.

## NOTES

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